

ON *HELIX BASILEUS*, BENSON, FROM SOUTHERN INDIA :
ITS ANATOMY AND GENERIC POSITION.

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PLATE VI.

MALACOLOGISTS interested in the generic position of species of Indian Land Mollusca are very greatly indebted to Dr. Thurston for the trouble and pains he took to obtain an individual of this fine species, "a giant among the Testacea of Hindustan," as Benson writes. To Dr. Thurston we already owe our thanks for examples of a number of species not only interesting, but valuable, because nothing was known of their anatomy, or of their relationships. The very large forms are not usually abundant, and their size renders it difficult to preserve the animal, unless the collector starts for their habitat properly equipped for the purpose. For many years I have been hoping to obtain the animal of the species under consideration, and I have now to thank my friend Dr. Blanford for entrusting one to me for examination, a piece of work which has proved as absorbing as was that on another species from the south of India, viz. *Ariophanta ampulla*, described last year in these pages (vol. iv, p. 187).

The shell of *Helix Basileus* was described by Mr. W. H. Benson in the Annals and Magazine of Natural History, ser. III, vol. vii (1861), p. 81. He says, "This magnificent species (received through Lieut. Charles Annesley Benson), measuring nearly three inches in diameter, was discovered by Lieut. W. Cox, of the 45th Madras Regiment of Infantry."

Animal.—General colour a ruddy ochre, the peripodial margin streaked with lilac. No parallel grooves above, as in *Macrochlamys* and most genera of the Zonitidæ. The general surface of the foot is smooth; seen from above a fine groove runs down the centre of its rounded dorsal surface, having fine close grooves leading from it; they soon disappear, and the surface is broken up into irregular, small, oval or diamond-shaped papillæ. The sole of the foot is pale ash-grey in colour and quite smooth, although the spirit has contracted it into an irregular fold on the centre line. The mucous gland is linear and long, without any overhanging lobe. The mantle-margin forms a continuous

plain border to the peristome; there are no shell-lobes. The right dorsal lobe is fairly large, the left formed into two distinct lappets, only separated by a narrow slit. The anterior part is a large solid fleshy mass of a dark reddish-brown colour upon a paler flattened base; the posterior is of the same character, but paler in colour. The visceral sac is darkly coloured near the mantle-margin, beginning with a narrow, dark grey, band adjacent to the edge. It is then closely mottled with black for 13 mm. backwards, gradually shading off. On the side of the rectum and following the suture is a band with a white ground very finely speckled with black. The renal organ is conspicuous, 17 mm. long by 3.5 mm. wide, of an ochre-brown tint, with a very blackly mottled margin of the same breadth on the inner or sutural side of the visceral whorl. The integument covering the heart was too opaque to show that organ, owing perhaps to the action of the alcohol.

Generative Organs.—The retractor muscle of the penis is attached to the end of a cæcum given off at the main bend. There is no flagellum: the vas deferens joins the point of a rounded knob-like process. The amatorial organ is large, bent on itself, tapering towards the retractor muscle end. The spermatheca is small, an ovate-shaped bag on a short stalk. In this specimen it was pointed in form (Pl. VI, Fig. 3, *sp.*), owing to the presence of a spermatophore. On cutting open the envelope this was found to consist of a long cylindrical capsule (Fig. 3*a*), rather solid, and 29 mm. in length. No spined portion was seen, for most unfortunately it fell from the glass slip on to the ground, and a certain portion was broken off. There was sufficient to show that the organ in this genus differs very much in its conformation from the type of spermatophore found in *Macrochlamys*, *Bensonia*, and *Girasia*. The genitalia, compared with other species known to me, come nearest to that of *Nilgiria solata*.¹

The salivary gland is large and wide, in one mass, spreading in a thin layer over the capacious stomach. Only one duct was observed (the other may have been broken), this, close to the more solid anterior part, divided into two.

The radula (Fig. 5) is very broad, 5.5 mm., its length being 11 mm. The rhachidian tooth is tricuspid, the admedian teeth are elongate with a cusp on the outer side, the laterals are aculeate, slightly curved in form, they become shorter and more slender, and the outermost are blunt and minute, thus resembling those of *Ravana politissima* (Pfr.), but the formula is different, viz.:—56 : 2 : 28 : 1 : 28 : 2 : 56. This formula corresponds within 2 of *Nilgiria Chennai*, but in that species the admedian teeth are tricuspid.

The jaw (Fig. 4) is solid, with a central projection on a concave cutting edge.

Benson, judging from shell characters alone, was quite right in saying, "*Helix Basileus* is related to the Cingalese group containing

¹ In *Ariophanta Dalyi* it may be noticed what a very small and rudimentary flagellum is present near the junction of the vas deferens with the penis.

H. Chenui and *H. ganoma*, Pfr., approaching the latter in the more depressed spire and the want of solidity, and differing from both shells in its planate whorls and simple suture." After some further remarks regarding *H. Chenui*, he alludes to the shell of *H. Humphreysiana*, Lea, as being somewhat similar on the under side, and it was very natural that he should make a comparison between these two large species.¹

I place the species under review in the subgenus *Nilgiria*; it agrees in all its chief characters with those species of that subgenus hitherto known to me, except in the dental formula and in the shape of the central and admedian teeth, which, curiously enough, are like those of *Ariophanta* (*Indrella*) *ampulla* (Bens.).

I have more than once alluded to the distinctness of the molluscan genera of the family Zonitidæ in southern India and Ceylon. Nothing corresponding to them as far as the anatomy is concerned has been found for any distance outside the Peninsula area. *Ariophanta interrupta* (Bens.) is an exception and was collected by me in the Jessore District, near Calcutta, having pushed its way thus far to the eastward, but I did not find it on the left bank of the Brahmaputra River. *A. interrupta* occurs on the right bank of the Ganges in the Rajmahal Hills, and could very easily be transported down that river and on to the area on the eastern side. The landshells of the delta must all have had their original home higher up the Gangetic valley on the one side, or the Brahmaputra on the other.

It is interesting to find so many species of land mollusca in southern India and Ceylon differing so widely in the form of their shells and yet having the animals on a common plan. This feature, however, is met with in other families. A distinctly parallel case on a smaller scale may be noted even in the Zonitidæ. In the western and eastern Himalayas the genus *Bensonia* is represented not only by large, strongly built shells, but also in the latter area by a thin and transparent form not yet described and unlike the first in every way.

In Tenasserim and the Malay Peninsula we do not find molluscs resembling *Nilgiria* in their anatomy, but we find other typical groups, *Xesta* and *Hemiplecta*, predominant, with characters of their own. *Macrochlamys*, from being the commonest form in Bengal, the Himalayas, and Assam, ranging to Burmah and even to the Andamans, is scarce in the Malay Peninsula, and I doubt very much if, when the species at present put into this genus from Malayana and Japan, etc., come to be dissected, they will be found to agree with the typical Indian forms.

Up to the present time I have not seen a *Macrochlamys* from either Borneo or the Celebes. Species with shells somewhat like those of *Macrochlamys*, such as *Everettia consul*, *E. jucunda*, and

¹ I may point out that in *H. Humphreysiana*, the type of the genus *Hemiplecta*, from Singapur, the animal differs from *H. Basileus* in many important characters, viz.: (1) the genitalia; (2) the form of the teeth; (3) the formula of the radula; (4) the presence of shell-lobes, the most striking among the external characters; and (5) the type of sole of foot.

E. Moellendorffi, are in no sense related to that genus. In these Bornean forms the most striking difference from *Macrochlamys* is seen in the genitalia, in the form of the amatorial organ and its dart. We find this same structure of the amatorial organ is not confined to the genus *Everettia*, but recurs in species with very differently formed shells, such as *Dyakia Hugonis*, *D. Rumphii*, and *D. raregutata*, which Semper included in *Ariophanta*, and thus, in fact, we have in the Malay Archipelago a local generic group very similar to one found in southern India.

It may be noted I do not accept the subgeneric title of *Xestina* for the southern Indian forms, because a genus should be properly described, and a type-species indicated. If this rule were always followed much uncertainty and confusion would be avoided.

The history of *Xestina* may be summed up as follows :—

Albers: "Die Heliceen," 1860, pp. 50, 51. Created *Xesta*, gave

a description of the shell characters, and made two divisions :—

(a) *Testa solidula*; type, *Nanina Stuartiæ*, Sow., from Celebes.

(b) *Testa pellucida*; type, *N. citrina*, Linn., from Amboina.

Semper: "Reisen im Archipel der Philippinen," 1870, pp. 55–68.

Divided *Xesta* into three groups, unnamed.

Pfeffer: Jahrb. Deutsch. Malak. Ges., 1878, p. 257. Indicated *Xestina*, did not describe it, but in connection with it mentioned first and more particularly the species *N. Siamensis*, thereby indicating this species possessed the characters of his new genus better than any other; next he alludes to *N. Isabellinus* (since shown to be a *Euplecta*) and four other species.

Pfeffer: Abh. Ver. Hamb., vol. vii, pt. 2 (1882), p. 13. Stated that Semper's group of five South Indian species comprised the genus *Xestina*; but neither the characters of the genus nor the type are indicated.

Godwin-Austen: "Land and Fresh-water Mollusca of India," vol. i (1888), p. 253. First refers to the genus *Nilgiria*, giving *solata*, Bs., as the type; he described the characteristic points of the genus and the anatomy of the type in the same work, vol. ii (1898), pp. 77, 78, since found by him to agree with two species, *Nanina Tranquebarica* and *N. bistrialis*, which are included in Semper's group of *Xesta* above alluded to.

Touching Pfeffer's first work of 1878, the anatomy of *N. Siamensis* has, I believe, not yet been described, but supposing that it should turn out to be peculiar and of generic value, would it not be entitled to Pfeffer's name *Xestina*? He at the time was discussing the form of the foot in the *Naninidæ*, and did not carry his investigations with reference to *Siamensis* much beyond that point; he may have had the form of the shell also in mind, but it is impossible now to interpret exactly, owing to the lapse of time and the work done since by others, what Pfeffer understood as the typical characters of *Xestina*, but it seems to me that the species *Siamensis*, the first he selected, expressed them most forcibly at that period.

EXPLANATION OF PLATE VI.

- FIG. 1. Animal, shell removed, viewed from the left side, showing renal organ, etc., and position of the amatorial organ within the visceral sac.
- ,, 1a. Animal viewed from the front, showing mantle-edge and dorsal lobes.
- ,, 1b. Animal seen from the back, showing mucous gland.
- ,, 2. Mantle-margin, much enlarged, with part of sole of the foot.
- ,, 2a. Mantle-margin, showing more of the right side.
- ,, 3. Generative organs separated out.
- ,, 3a. Portion of spermatophore removed from the spermatheca.
- ,, 4. Jaw.
- ,, 5. Teeth of the radula, at various points in the row.

<i>am. ov.</i>	amatorial organ.	<i>post. l.d.l.</i>	posterior left dorsal lobe.
<i>ant. l.d.l.</i>	anterior left dorsal lobe.	<i>r.</i>	renal organ.
<i>c.r.p.</i>	cæcum of the penis and retractor muscle.	<i>r.m.</i>	retractor muscle.
<i>gen. ap.</i>	generative aperture.	<i>r.m.p.</i>	retractor muscle of penis.
<i>h.</i>	heart.	<i>s.</i>	slit, dividing the anterior left dorsal lobe from the posterior.
<i>ot.</i>	ovitheca (supposed).	<i>sp.</i>	spermatheca.
<i>ov.</i>	oviduct.	<i>v.d.</i>	vas deferens.
